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**From:** Larry Ladd [lladd@sprintmail.com]  
**Sent:** 5/16/2018 9:09:04 PM  
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**CC:** lladd@sprintmail.com  
**Subject:** Radiostrontium in dirt basics

Strontium 90 acts like calcium. It does not emit gamma radiation, it emits beta radiation (electrons), although when the electrons are absorbed gamma rays are emitted. Strontium should leach down into the soil to the B layer, the hard pan, which in a well-developed soil is about three feet down. Area 40 being on a slope the soils are more shallow and the structure is more spotty. If the soil column is largely regolith -- rocks and gravel -- the bedrock slate on which the soil sits may very well serve as the "hard pan."

The way you measure Strontium 90 is chemically extract it from the soil sample and then measure total beta radiation (flying electrons) in the lab. The lab work presented to me only looks at gamma electromagnetic. The correlation between potassium 40 and the static counts is no guarantee that the source is K-40 embedded in the Mariposa slate bedrock, because that is also the general area where the calcium, strontium, and barium will accumulate in the soil column as well -- especially the barium, as it can bond with the potassium (See paragraph 3, page 1 here: <https://www.degruyter.com/downloadpdf/j/ssa.2013.64.issue-1/ssa-2013-0001/ssa-2013-0001.pdf>). I would have to look at their sampling protocol to have faith in the data.

You are going to find both potassium and strontium in the B horizons, the zone of illuviation [http://www.earthonlinemedia.com/ebooks/tpe\\_3e/soil\\_systems/soil\\_development\\_profiles.html](http://www.earthonlinemedia.com/ebooks/tpe_3e/soil_systems/soil_development_profiles.html) If the soil has a well developed structure, potassium will be highest in the clayish Bt horizon, and strontium should be highest in the whitish Bk horizon with calcium nodules. I don't know that you have these kinds of well-stratified soils on Area 40 proper, but they are certainly present near by.

Janis will appreciate this passage from <https://www.atsdr.cdc.gov/PHS/PHS.asp?id=654&tid=120> "However, strontium compounds may stay in the soil for years without moving downward into groundwater. In the environment, chemical reactions can change the water-soluble stable and radioactive strontium compounds into insoluble forms. In some cases, water-insoluble strontium compounds can change to soluble forms." You can go into more detail here: <https://www.nature.com/scitable/knowledge/library/introduction-to-the-sorption-of-chemical-constituents-94841002>